

Meteorology (BS)

To see more about what you will learn in this program, visit the Learning Outcomes website (<https://apps.oirp.ncsu.edu/pgas/>)!

The degree of Bachelor of Science in Meteorology is offered in the Department of Marine, Earth and Atmospheric Sciences. A concentration in Marine Science may also be chosen.

Meteorologists study a diverse array of topics, including climate, air pollution, environmental impacts, weather analysis and forecasting, remote sensing, atmospheric physics and interactions between the atmosphere and other components of the earth system. Our undergraduate students pursue careers in air quality, weather forecasting, meteorological research, broadcast meteorology and positions with the armed forces. The proximity of the Environmental Protection Agency center in nearby Research Triangle Park, the NC Department of Air Quality, a strong working relation with the local media, and the presence of the State Climate Office and a NWS forecast office on the NC State campus all provide our students with a broad range of internship and employment possibilities.

Contact

For more information about our meteorology programs, visit our website (<https://meas.sciences.ncsu.edu/undergraduate/programs/atmospheric-science/>) or contact:

Maggie Puryear

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Plan Requirements

Code	Title	Hours	Counts towards
Orientation			
COS 100	Science of Change ¹	2	
English / Communication			
ENG 101	Academic Writing and Research ²	4	
Select one of the following		3	
Advanced Writing courses:			
ENG 331	Communication for Engineering and Technology		
ENG 332	Communication for Business and Management		
ENG 333	Communication for Science and Research		
Math / Statistics			
MEA 217	Introduction to Computing in the Geosciences ²	3	
or MA 116	Introduction to Scientific Programming (Math)		
or PY 251	Introduction to Scientific Computing		

or CSC 113	Introduction to Computing - MATLAB	
MA 141	Calculus I ²	4
MA 241	Calculus II ²	4
MA 242	Calculus III	4
MA 341	Applied Differential Equations I	3
ST 311	Introduction to Statistics	3
or ST 370	Probability and Statistics for Engineers	
or ST 371	Introduction to Probability and Distribution Theory	
Chemistry / Physics		
CH 101	Chemistry - A Molecular Science ²	3
CH 102	General Chemistry Laboratory	1
Chemistry Option (p. 3)		4
PY 205 & PY 206	Physics for Engineers and Scientists I and Physics for Engineers and Scientists I Laboratory ²	4
Meteorology Core		
MEA 100	Earth System Science: Exploring the Connections	4
MEA 215	Introduction to Atmospheric Sciences	4
MEA 312	Atmospheric Thermodynamics ²	4
MEA 315	Mathematics Methods in Atmospheric Sciences ²	4
MEA 321	Fundamentals of Air Quality and Climate Change ²	3
MEA 412	Atmospheric Physics ²	3
MEA 421	Atmospheric Dynamics I ²	3
MEA 422	Atmospheric Dynamics II ²	3
MEA 443	Synoptic Weather Analysis and Forecasting	4

MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1
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Major Electives

Geophysical Science Option (p. 3)	3
MEA Restricted Electives (p. 2)	9
Approved Electives ³	16

Approved Electives constitute a minor field of emphasis consisting of at least 12 credit hours in a single discipline or related disciplines. These include, but are not limited to: biometeorology, chemistry, computer science, environmental quality, geology-geophysics, hydrology, mathematics, physics, physical oceanography, statistics, several areas of engineering, agriculture, forestry, science education, weather communication.

GEP Courses

GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	6
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)	6
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	2
GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/) (Humanities/Social Sciences/Visual and Performing Arts)	3
GEP U.S. Diversity (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-us-diversity/) (verify requirement)	
GEP Global Knowledge (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-global-knowledge/) (verify requirement)	

Foreign Language Proficiency (<http://catalog.ncsu.edu/undergraduate/gep-category-requirements/foreign-language-proficiency/>) (verify requirement)

Total Hours **120**

- ¹ COS 100 is for new freshmen only. Transfer students will need to select a course from the GEP Interdisciplinary Perspectives course list
- ² A grade of C- or higher is required.
- ³ Approved Electives should be selected in consultation with advisor. In order to qualify for federal civil servant meteorologist positions (i.e. National Weather Service), you must satisfy the GS 1340 requirements. As a result the following courses are strongly recommended: PY208/209, MEA 443, MEA 444, and MEA 511.
- ⁴ Advanced transfer students are permitted to substitute mathematics, science, or engineering credits for CH 201/202.

MEA Restricted Electives

Code	Title	Hours	Counts towards
MEA 415	Climate Dynamics	3	
MEA 425	Introduction to Atmospheric Chemistry	3	
MEA 444	Mesoscale Analysis and Forecasting	4	
MEA 455	Micrometeorology	3	
MEA 458	Introduction to Tropical Meteorology	3	
MEA 463	Fluid Physics	3	
MEA 467	Marine Meteorology	3	
MEA/CE 479	Air Quality	3	
MEA 488	Meteorology for Media	3	
MEA 493	Special Topics in MEAS		
MEA 498	Internship in MEAS	1-6	
MEA 510	Air Pollution Meteorology	3	
MEA 511	Introduction to Meteorological Remote Sensing	3	
MEA 514	Advanced Physical Meteorology	3	
MEA 515	Climate Dynamics	3	
MEA 517	Fundamentals of Climate Change Science	3	

MEA 518	Adaptation to Climate Change	3
MEA 519	Barriers to Climate Change Literacy	3
MEA 525	Introduction to Atmospheric Chemistry	3
MEA/CE 579	Principles of Air Quality Engineering	3
MEA 580	Air Quality Modeling and Forecasting	4
MEA 581	Fluid Mechanics in Natural Environments	3
MEA/GIS 582	Geospatial Modeling	3
MEA 593	Special Topics in Atmospheric Science	1-6

Chemistry Option

Code	Title	Hours	Counts towards
CH 201 & CH 202	Chemistry - A Quantitative Science and Quantitative Chemistry Laboratory	4	
CH 220 & CH 222	Introductory Organic Chemistry and Organic Chemistry I Lab	4	
CH 221 & CH 222	Organic Chemistry I and Organic Chemistry I Lab	4	

Geophysical Science Elective

Code	Title	Hours	Counts towards
MEA 101	Geology I: Physical	3	
MEA 200	Introduction to Oceanography		
PY 123	Stellar and Galactic Astronomy	3	
PY 124	Solar System Astronomy	3	
SSC 200	Soil Science	3	

Semester Sequence

This is a sample.

First Year

Fall Semester		Hours
CH 101	Chemistry - A Molecular Science (CP) ²	3
CH 102	General Chemistry Laboratory	1
MA 141	Calculus I ²	4
MEA 100	Earth System Science: Exploring the Connections	4
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)		1
COS 100	Science of Change ¹	2
Hours		15

Spring Semester

Chemistry Option (p. 3)		4
ENG 101	Academic Writing and Research ²	4
MA 241	Calculus II ²	4
MEA 215	Introduction to Atmospheric Sciences	4
Hours		16

Second Year

Fall Semester

MA 242	Calculus III	4
MEA 217	Introduction to Computing in the Geosciences ²	3
MEA 321	Fundamentals of Air Quality and Climate Change ²	3
PY 205	Physics for Engineers and Scientists I (CP) ²	3
PY 206	Physics for Engineers and Scientists I Laboratory	1
Hours		14

Spring Semester

MA 341	Applied Differential Equations I	3
MEA 312	Atmospheric Thermodynamics ²	4
MEA 315	Mathematics Methods in Atmospheric Sciences ²	4
Approved Electives ³		4
Hours		15

Third Year

Fall Semester

Approved Elective		3
MEA 421	Atmospheric Dynamics I ²	3
Geophysical Science Option (p. 3)		3
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)		3
Statistics Option (p. 1)		3
Hours		15

Spring Semester

Advanced Writing Elective		3
Approved Elective ³		3
MEA 412	Atmospheric Physics ²	3
MEA 422	Atmospheric Dynamics II ¹	3
MEA 495	Junior Seminar in the Marine, Earth, and Atmospheric Sciences	1

GEP Additional Breadth (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/)	3
Hours	16
Fourth Year	
Fall Semester	
Approved Elective ³	3
MEA Restricted Electives (p. 2)	3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	3
GEP Health and Exercise Studies (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-health-exercise-studies/)	1
MEA 443 Synoptic Weather Analysis and Forecasting	4
Hours	14
Spring Semester	
Approved Elective	3
MEA Restricted Electives (p. 2)	3
MEA Restricted Electives (p. 2)	3
GEP Humanities (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-humanities/)	3
GEP Social Sciences (http://catalog.ncsu.edu/undergraduate/gep-category-requirements/gep-social-sciences/)	3
Hours	15
Total Hours	120

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³ Approved Electives should be selected in consultation with advisor. In order to qualify for federal civil servant meteorologist positions (i.e. National Weather Service), you must satisfy the GS 1340 requirements. As a result the following courses are strongly recommended: PY208/209, MEA 443, MEA 444, and MEA 511.

Career Opportunities

MEAS undergraduate degree programs provide talented students with the foundation of scientific knowledge required for careers in government, industry, or academia. Many students pursue graduate degrees and pursue careers in industry, at government agencies and in academia.

Marine Sciences graduates go on to become oceanographers, to manage our coastal resources, model air-sea interaction, and explore global climate change. They conduct basic and applied research, serving as environmental consultants for industry and governmental agencies, policy and management experts for governmental agencies, and environmental science educators. Graduates with a Natural Resources degree are versed in the fundamental processes and interdisciplinary nature of the coastal zone. As scientists, managers, administrators, and regulators, they make decisions regarding use and conservation of coastal and marine resources.

Geology graduates address society's needs for dealing effectively with earth processes, such as water resources and the stability of land forms. They work for engineering firms, permit-issuing agencies, and industries that rely on geological resources. Historical geologists are familiar with the evolution of earth through time and provide a perspective

on potential long-term reactions of the earth systems to change. Those who concentrate in Environmental Geology are trained to assess and monitor geological resources such as ground water. Marine geologists are experts in the complex issues facing industry, municipalities, and residents in the dynamic and ecologically vulnerable coastal zone.

Meteorology graduates enjoy careers in weather forecasting, air quality assessment, development of weather products and services, broadcast communications, and advanced research. Marine meteorologists study ocean-generated weather systems. Their research is yielding practical benefits such as refined prediction of storm surge, which has streamlined evacuation efforts during severe storms along the Carolina coast. Meteorology graduates with an air quality emphasis work for environmental firms, regulatory agencies, and in applied research. Study of air quality and how air pollution is transported and dispersed is a rapidly expanding field in the atmospheric sciences.

MEAS graduates play a key service role for the State of North Carolina, assisting in everything from forecasting severe storms and analyzing the impact of atmospheric pollutants on agriculture and our estuaries, to determining the effects of toxic waste disposal on quality of surface and ground water.